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L7: Entry 1 of 2

File: JPAB

Mar 1, 1994

PUB-NO: JP406055913A

DOCUMENT-IDENTIFIER: JP 06055913 A

TITLE: PNEUMATIC TIRE

PUBN-DATE: March 1, 1994

INVENTOR-INFORMATION:

NAME

COUNTRY

HIMURO, YASUO

ASSIGNEE-INFORMATION:

NAME

COUNTRY

BRIDGESTONE CORP

APPL-NO: JP04211593

APPL-DATE: August 7, 1992

US-CL-CURRENT: 152/209.12

INT-CL (IPC): B60C 11/12; B60C 11/03

ABSTRACT:

PURPOSE: To provide a tread pattern which achieves low pattern noise particularly among the tire noises, and excellent drainage performance.

CONSTITUTION: In a pneumatic tire whose tread is divided into multiple land parts 5-9 ranging along the tread circumferential direction by multiple main grooves 1-4 and tread edges T extended along the tread circumferential line and arranged along the tread width direction at certain intervals, sipes 10 extended from its one end to its other end continuously or intermittently in s-shapes are arranged on the tread along the tread circumferential direction at approximately equal intervals and a lot of lug grooves 12-14, which are wider than the sipes, are arranged on the sipes so as to be extended along the direction crossing the sipes and in positions where they at the main grooves 1-4 respectively.

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L7: Entry 2 of 2

File: DWPI

Mar 1, 1994

DERWENT-ACC-NO: 1994-106482

DERWENT-WEEK: 199413

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TITLE: Pneumatic tyre with improved wet performance - having S-shaped sipe extending from one end of other end of tread, and lug grooves along and crossing sipe

PATENT-ASSIGNEE:

ASSIGNEE

CODE

BRIDGESTONE CORP

BRID

PRIORITY-DATA: 1992JP-0211593 (August 7, 1992)

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PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
<input type="checkbox"/> JP 06055913 A	March 1, 1994		005	B60C011/12

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 06055913A	August 7, 1992	1992JP-0211593	

INT-CL (IPC): B60C 11/03; B60C 11/12

ABSTRACTED-PUB-NO: JP 06055913A

BASIC-ABSTRACT:

In a pneumatic tyre with circumferential grooves, sipes extending from one end to the other of the tread in an S form continuously or intermittently, are arranged at almost equal intervals in the circumferential direction. Lug grooves wider than the sipes extend on the sipe and in the direction that they cross the sipe, and are opened to the circumferential grooves.

The width of sipes is pref. as small, 0.5 to 1.5 mm, as they can be closed when they are in contact with the ground. The width of lug grooves is pref. as large, 2 to 4 mm, as they can offer the edge effect and excellent wet performance.

ADVANTAGE - This tyre can combine excellent wet performance and low noise level, which have been difficult to be compatible with each other, and can realise a high performance tyre.

CHOSEN-DRAWING: Dwg.0/3

TITLE-TERMS: PNEUMATIC TYRE IMPROVE WET PERFORMANCE S=SHAPED SIPE EXTEND ONE END
END TREAD LUG GROOVE CROSS SIPE

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

ENHANCED-POLYMER-INDEXING:

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Q9212 ; K9416

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SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C1994-049061

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B60C 11/12

11/03

識別記号

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Z 8408-3D

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(21)出願番号

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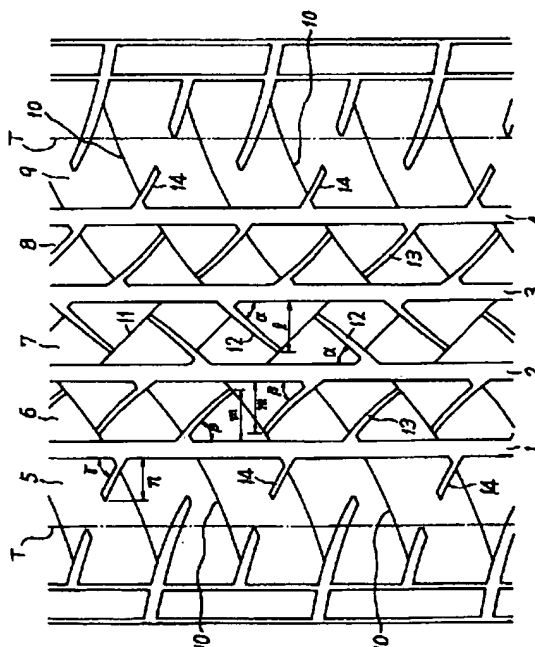
(74)代理人 弁理士 杉村 暁秀 (外5名)

(54)【発明の名称】 空気入りタイヤ

(57)【要約】

【目的】 タイヤ騒音、中でもパターンノイズの低く、かつ排水性にも優れるトレッドパターンについて、提案する。

【構成】 タイヤのトレッドを、トレッド周線に沿って延びトレッド幅方向に間隔を置いて配した、複数の主溝1~4およびトレッド端Tによって、トレッドの周方向に連なる複数の陸部5~9に区画した、空気入りタイヤにおいて、上記トレッドに、その一端から他端へ連続または断続してS字状に延びるサイブ10を、トレッドの周方向にはほぼ等間隔に配置し、該サイブよりも幅広のラグ溝12~14を、サイブ上およびサイブと交差する向きに延びて、それぞれ主溝に開口する位置に、多数設ける。



【特許請求の範囲】

【請求項1】 タイヤのトレッドを、トレッド周線に沿って延びトレッド幅方向に間隔を置いて配した、複数の主溝およびトレッド端によって、トレッドの周方向に連なる複数の陸部に区画した、空気入りタイヤにおいて、上記トレッドに、その一端から他端へ連続または断続してS字状に延びるサイプを、トレッドの周方向にほぼ等間隔に配置し、該サイプよりも幅広のラグ溝を、サイプ上でおよびサイプと交差する向きに延びて、それぞれ主溝に開口する位置に、多数設けてなる、空気入りタイヤ。

【発明の詳細な説明】

【0001】

【産業上の利用分野】この発明は、タイヤ騒音、中でもパターンノイズの低いトレッドパターンをそなえる空気入りタイヤに関する。

【0002】

【従来の技術】パターンノイズは、トレッド接地面に占める溝の比率、いわゆるネガティブ比を低下する手法、ブロックパターンをリブパターンまたはリブパターンに近い形状とするリブ化の手法、そしてトレッド周線に沿って延びる複数の主溝で区画された陸部を、複数のブロックに区分する横溝を配置するトレッドパターンにおいて、該横溝の位相を陸部間でずらす手法などによって、低減が可能である。

【0003】

【発明が解決しようとする課題】中でも、ネガティブ比を低下する手法が最も効果的であるが、ネガティブ比を低下すると、ウェット性能、特に排水能力が低下するところに問題がある。同様に、リブ化の手法もウェット性能の低下をまねく。一方、横溝の位相をずらす手法は、タイヤに必要な他の性能を低下することが少ないが、トレッドパターンの美観を損なうこともあるため、トレッドパターンによっては適用できない不利がある。さらに、横溝の位相ずらしによって接地時の衝撃を分散するだけでは、パターンノイズの低減は不十分である。

【0004】そこで、この発明は、上記の諸問題を一挙に解消し得るトレッドパターンについて、提案することを目的とする。

【0005】

【課題を解決するための手段】発明者らは、上記の目的を充足し得るトレッドパターンについて検討したところ、周溝と交わる向きに延びる溝の形状を工夫することが、他機能を犠牲にすることなしにパターンノイズを低減するのに有利であることを見出し、この発明を完成するに至った。すなわちこの発明は、タイヤのトレッドを、トレッド周線に沿って延びトレッド幅方向に間隔を置いて配した、複数の主溝およびトレッド端によって、トレッドの周方向に連なる複数の陸部に区画した、空気入りタイヤにおいて、上記トレッドに、その一端から他

端へ連続または断続してS字状に延びるサイプを、トレッドの周方向にほぼ等間隔に配置し、該サイプよりも幅広のラグ溝を、サイプ上でおよびサイプと交差する向きに延びて、それぞれ主溝に開口する位置に、多数設けてなる、空気入りタイヤである。

【0006】さて、図1にこの発明に従う空気入りタイヤのトレッドの要部を示し、このトレッドを、トレッド周線に沿って延び、この例でトレッド幅方向にほぼ等間隔で配置した主溝1〜4およびトレッド端Tによって、トレッド周方向に連なる陸部5〜9を、トレッド中央に1列、その両側に各2列、合計5列で区画してなる。さらに、両トレッド端T間で、この例で断続してS字状に延びるサイプ10を、トレッド周方向にほぼ等間隔で配置することによって、陸部5〜9をそれぞれ多数区分に分断してなる。また、陸部7には、サイプ10とほぼ直交する向きに延びるサイプ11を、追加してある。

【0007】ここで、サイプ10上またはサイプ12端を発し、このサイプよりも幅の広いラグ溝12を主溝に開口する位置に設けるとともに、サイプ10と交差する向きに延びて主溝に開口する位置に、ラグ溝13および14を設けることが、肝要である。なお、いずれのラグ溝も、その長さが各陸部幅の1/2 以上は必要である。

【0008】すなわち、図示例のラグ溝12は、陸部7のサイプ10の軌跡上にあり、上記サイプ11を始点として主溝2または3へ向かって延び、それぞれの主溝に開口する。そして、ラグ溝12は開口側の主溝2または3に対して、傾斜角度 α が30°〜50°で、主溝とその始端とのトレッド幅方向長さlが陸部7の幅の60〜90%となる領域に設けることが、好ましい。

【0009】一方、ラグ溝13は、陸部6および8において、サイプ10を始点として該サイプと交差する向きに延びて主溝1、3または2、4に開口する。ラグ溝13においても、開口側の主溝1、3または2、4に対して、傾斜角度 β が60°〜30°で、主溝とその始端とのトレッド幅方向長さmが陸部6または8の幅の60〜90%で設けることが、好ましい。

【0010】ラグ溝14は、陸部5および9において、該陸部内を始点としてサイプ10と交差する向きに延びて主溝1または4に開口する。ラグ溝14においても、開口側の主溝1または4に対して、傾斜角度 γ が50°〜70°で、主溝からその始端までのトレッド幅方向長さnが陸部5または9の幅の50〜80%で設けることが、好ましい。

【0011】特に、図示例では、陸部6、7および8において、各陸部の両側の主溝に、ラグ溝が交互に開口し、さらに隣合う陸部6および7、または7および8で、ラグ溝の傾斜方向が異なる、配置になる。

【0012】なお、サイプ10および11は、接地域にあるときに閉じる程度の幅、具体的には約0.5〜1.5mm程度の幅を有し、ラグ溝12〜14はエッジ効果と充分なウェッ

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ト性を得るための幅、具体的には約2~4mm程度の幅を有する。さらに深さについては、サイブおよびラグ溝ともに、主溝深さより若干浅い程度とする。

【0013】また、この発明に従う他のトレッドパターンを図2に示す。同図に示すトレッドパターンは、図1に示したトレッドパターンにおける、サイブ10を両トレッド端T間で連続して延びる構成とし、さらに主溝1および4のトレッド端T側に間隔を置いて、細溝15および16を配置し、これら細溝に開口するラグ溝17を、陸部5および9に新たに設けたものである。

【0014】ここに、この発明に従うタイヤの他の構造は、従来タイヤの慣習に則ったものでよい。例えば、カーカスは、ビードコアのまわりをタイヤの内側から外側へ巻返した少なくとも1枚（多くて3枚）のターンアッププライになり、プライはレーヨン、ナイロンおよびポリエステルで代表される繊維コードをタイヤの赤道面と実質的に直交する方向（ラジアル方向）に配列したものを、ベルト層は、スチールコード、芳香族ポリアミド繊維コードなどの非伸長性コードをタイヤの赤道面に対して10~35°の角度で配列したベルトの少なくとも2層を互いに交差させて配置した主ベルト層の全幅にわたり、ナイロンコードで代表される熱収縮性コードをタイヤの赤道面と実質上平行に配した少なくとも1枚の補助ベルト層を、その形成に当っては主ベルト層の円周に沿ってコードを複数本並べたりボン状態によりらせん巻きしてなるものをそれぞれ用いる。そしてこのベルト層上に、上記したトレッドパターンになるトレッドを配置する。

【0015】

【作用】両トレッド端間でS字状に延びるサイブを、トレッド周方向にほぼ等間隔に設けることによって、パターンノイズを増大することなしに、トレッドの接地性を改善して乗り心地を向上し、またサイブによるエッジ効果によってウェット性能をも向上する。なお、サイブの主溝に対する傾きは、平均で40~70°程度とすることが、好ましい。

【0016】さらに、ラグ溝を、サイブ上およびサイブと交差する向きに延びて、それぞれ主溝に開口する位置に、多数設ける構成、すなわちラグ溝は、陸部を挟む両側の主溝間で貫通しないため、各陸部は事実上トレッド周方向に連続する、リブとなり、従ってパターンノイズの低減が可能となる。

【0017】ここで、上記したように、ラグ溝の主溝とその始端とのトレッド幅方向長さ1、mおよびnを、好ましくはトレッド幅の1/2以上とするのは、1/2未満ではウェット性能が著しく劣化するからである。また、上限はトレッド幅の90%とすることが好ましいが、これは90%をこえると陸部の周方向連続性が損なわれて、パターンノイズが増大するからである。さらに、ラグ溝の傾斜角度 α 、 β および γ の好適範囲は30~70°であり、す

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なわち30°未満では、ラグ溝、サイブおよび主溝に囲まれた陸部が小さくなり、ブロック剛性の不足により、偏摩耗が発生し易くなり、一方70°をこえると、ラグ溝とサイブの交差によってできる陸部の鋭角部が小さくなり、これも同様に偏摩耗が発生し易くなる。

【0018】なお、図1および2に示したトレッドパターンは、上記の基本パターンに則り、さらに各陸部の両側の主溝に、ラグ溝が交互に開口する配置としたため、ラグ溝を介して、陸部を挟む両側の主溝の双方に、均等に排水を行うことができる。

【0019】

【実施例】図1および2に示したトレッドパターンに従って、タイヤサイズ205/65 R15の空気入りラジアルタイヤ（トレッド幅：140mm）を、次の各仕様の下に、それぞれ試作した。

【0020】すなわち、図1のトレッドパターンに従う、供試タイヤAにおいて、主溝1~4は幅：6mmおよび深さ：8mmで、サイブ10は幅：0.7mm、深さ：6.5mmおよび主溝に対する平均傾斜角度：55°とした。また、ラグ溝12は幅：2~3mm、深さ：6.5mm、長さl：17mmおよび傾斜角度 α ：40°で、同様にラグ溝13は幅：2~3mm、深さ：6.5mm、長さm：18mmおよび傾斜角度 β ：40~50°、ラグ溝14は幅：2.5~3mm、深さ：6.5mm、長さn：14mmおよび傾斜角度 γ ：60°とした。

【0021】一方、図2のトレッドパターンに従う、供試タイヤBは、上記供試タイヤAにおいて、幅：1mmおよび深さ：6.5mmの細溝15および16を設けるとともに、新たにラグ溝14と同様のラグ溝17を設けたものである。このトレッドパターンでは、ラグ溝12は幅：2.5mm、深さ：6.5mm、長さl：8mmおよび傾斜角度 α ：40°で、同様にラグ溝13は幅：3mm、深さ：6.5mm、長さm：12mmおよび傾斜角度 β ：50°、ラグ溝14は幅：3.5mm、深さ：6.5mm、長さn：12mmおよび傾斜角度 γ ：60°とした。

【0022】また比較として、図3に示すトレッドパターンについても、同様のサイズでタイヤ（比較タイヤC）を試作した。同図に示すトレッドパターンは、2本の中央主溝20の両側に1対の細溝21を配置し、その外側に1対の主溝22を配置し、さらにその外側に1対の細溝23をそれぞれ配置し、細溝21および23で区画されたトレッド中央域Cおよびその両側域Sに、主溝に対して傾いた向きで延びる、細幅の横溝24および25を配置してなる。なお、中央主溝20および主溝22は幅：7mmおよび深さ：8mm、細溝21および23は幅：1.2mmおよび深さ：6.5mm、横溝24および25は、幅：2~3mmおよび深さ：6.5mmで、傾斜角：45~70°で延びる、配置とした。

【0023】これらの試作タイヤを、それぞれパターンノイズ試験とハイドロプレーニング試験に供した結果を、表1に示す。なお、各試験の評価は比較タイヤCの各試験結果を100としたときの指数であらわした。

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【0024】ここで、パターンノイズ試験は、内圧1.8k gf/cm²としたタイヤを普通乗用車に装着後、2名を乗車させた状態にて、平滑路面上を40～100 km/hで走行させたときの、車内音をフィーリング評価した。

【0025】また、ハイドロプレーニング試験は、同様*

*の条件下にて、水深6mmの水路を80～90km/hで直進走行させたときの、踏面写真撮影によるトレッド接地面積の測定を行って、該面積の残存比を測定した。

【0026】

【表1】

	タイヤA	タイヤB	タイヤC
パターンノイズ	105	105	100
ハイドロプレーニング	100	100	100
備 考	実施例		比較例

【0027】

【発明の効果】この発明によれば、従来はトレッドパターンの改良のみではその両立が難しい、優れたウェット性能と低騒音特性とを兼備した、トレッドパターンを提供でき、トレッドパターンの改良によってタイヤの高性能化を実現し得る。

【図面の簡単な説明】

【図1】この発明に従うトレッドパターンの展開図である。

【図2】この発明に従う別のトレッドパターンの展開図である。

【図3】従来のトレッドパターンの展開図である。

【符号の説明】

1 主溝

2 主溝

※3 主溝

4 主溝

5 陸部

6 陸部

7 陸部

8 陸部

9 陸部

10 サイプ

11 サイプ

12 ラグ溝

13 ラグ溝

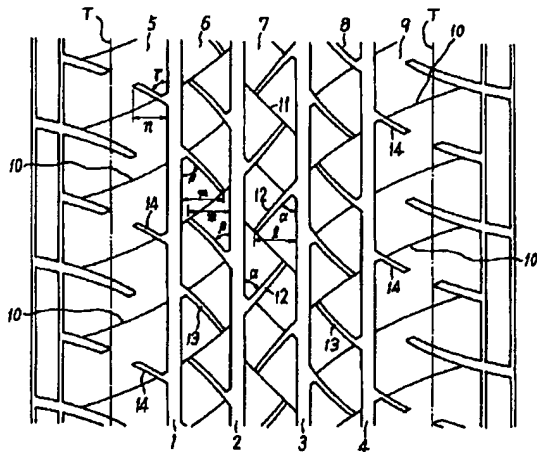
14 ラグ溝

15 細溝

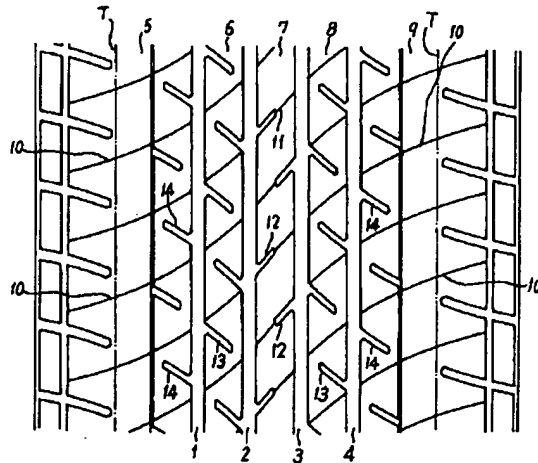
16 細溝

※ 17 ラグ溝

【図1】



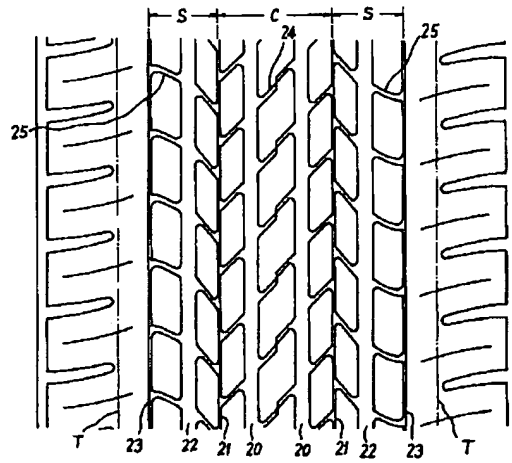
【図2】



(5)

特開平6-55913

【図3】



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the tire noise and the pneumatic tire which offers the low tread pattern of a pattern noise especially.

[0002]

[Description of the Prior Art] A pattern noise can be reduced in the tread pattern which arranges the transverse groove which classifies into two or more blocks the land part divided by the ratio of the slot occupied to a tread ground plane, the technique of falling the so-called negative ratio, the technique of rib-izing which makes a block pattern the configuration near a rib pattern or a rib pattern, and two or more major grooves prolonged along with the tread circumference by the technique of shifting the phase of this transverse groove between land parts etc.

[0003]

[Problem(s) to be Solved by the Invention] Although the technique of falling a negative ratio is the most effective especially, when a negative ratio is fallen, a problem is in the place to which the wet engine performance, especially wastewater capacity fall. Similarly, the technique of rib-izing also imitates wet performance degradation, and it is **. On the other hand, although the technique of shifting the phase of a transverse groove has falling [little] the engine performance of an and also [it is the need] to a tire, for a certain reason, spoiling the fine sight of a tread pattern also has disadvantage inapplicable depending on a tread pattern. ***** et al. [furthermore,] of a transverse groove -- carrying out -- as for reduction of a pattern noise, it is inadequate just to distribute the impact at the time of touch-down.

[0004] Then, this invention aims at what is proposed about the tread pattern which can solve many above-mentioned problems at once.

[0005]

[Means for Solving the Problem] When artificers examined the tread pattern which can satisfy the above-mentioned purpose, they came to complete a header and this invention for it being advantageous to reducing a pattern noise, without sacrificing other functions to devise the configuration of the slot which extends in the sense which crosses a circumferential groove. This invention by namely, two or more major grooves and tread edges which extended the tread of a tire along with the tread circumference, and kept and allotted spacing crosswise [tread] In the pneumatic tire divided to two or more land parts which stand in a row in the hoop direction of a tread SAIPU which continues or is intermittent from the end to the other end in the above-mentioned tread, and is prolonged in the shape of S character in it It is the pneumatic tire which arranges at equal intervals mostly to the hoop direction of a tread, and comes to prepare many lug slots broader than this SAIPU in the location which extends in the sense which is on SAIPU and intersects SAIPU, and carries out opening to a major groove, respectively.

[0006] Now, the important section of the tread of a pneumatic tire which follows this invention at drawing 1 is shown, and it divides in one train in the center of a tread, and comes to divide the land parts 5-9 which stand in a row in a tread hoop direction by the major grooves 1-4 and the tread edge T which

extended along with the tread circumference and have arranged this tread by at equal intervals mostly crosswise [tread] in this example in two trains each and a total of five trains on those both sides. Furthermore, it comes to divide land parts 5-9 in an a large number partition, respectively by arranging mostly SAIPU 10 which is intermittent in this example and is prolonged in the shape of S character between both the tread edges T at equal intervals to a tread hoop direction. Moreover, SAIPU 11 prolonged in the sense which intersects perpendicularly with SAIPU 10 mostly is added to the land part 7.

[0007] here -- a SAIPU 10 top -- or it is important to establish the lug slots 13 and 14 in the location which stems SAIPU 12, extends in the sense which intersects SAIPU 10 while establishing the lug slot 12 where width of face is wider than this SAIPU in the location which carries out opening to a major groove, and carries out opening to a major groove. In addition, for any lug slot, the die length is one half of each land part width of face. The above is required.

[0008] Namely, the lug slot 12 of the example of illustration is on the locus of SAIPU 10 of a land part 7, by making above-mentioned SAIPU 11 into the starting point, extends toward major grooves 2 or 3, and carries out opening to each major groove. And as for the lug slot 12, it is desirable to prepare in the field to which α is 30-50 degrees whenever [tilt-angle], and tread cross direction die-length l of a major groove and its start edge becomes 60 - 90% of the width of face of a land part 7 to the major grooves 2 or 3 by the side of opening.

[0009] On the other hand, in land parts 6 and 8, the lug slot 13 extends in the sense which intersects this SAIPU by making SAIPU 10 into the starting point, and carries out opening to major grooves 1 and 3, or 2 and 4. Also in the lug slot 13 It is desirable that β prepares at 60-30 degrees, and tread cross direction die-length m of a major groove and its start edge prepares whenever [tilt-angle] to the major grooves 1 and 3 by the side of opening, or 2 and 4 by 60 - 90% of the width of face of land parts 6 or 8.

[0010] In land parts 5 and 9, the lug slot 14 extends in the sense which intersects SAIPU 10 by making the inside of this land part into the starting point, and carries out opening to major grooves 1 or 4. Also in the lug slot 14 It is desirable that γ prepares at 50-70 degrees, and tread cross direction die-length n from a major groove to the start edge prepares whenever [tilt-angle] to the major grooves 1 or 4 by the side of opening by 50 - 80% of the width of face of land parts 5 or 9.

[0011] Especially, in the example of illustration, in land parts 6, 7, and 8, a lug slot carries out opening to the major groove of the both sides of each land part by turns, and it becomes the arrangement from which the inclination direction of a lug slot differs by the ***** land parts 6 and 7, or 7 and 8 further.

[0012] in addition, the width of face of extent closed when SAIPU 10 and 11 is in a touch-down region - concrete -- about 0.5-1.5mm width of face to have the width of face of extent and for the lug slots 12-14 obtain an edge effect and sufficient wet nature -- it specifically has width of face of about about 2-4mm. Furthermore, let SAIPU and a lug slot about depth be extent [a little] shallower than the major groove depth.

[0013] Moreover, other tread patterns according to this invention are shown in drawing 2 . The tread pattern shown in this drawing considers SAIPU 10 in the tread pattern shown in drawing 1 as the configuration continuously prolonged between both the tread edges T, keeps spacing in the tread edge T side of major grooves 1 and 4 further, arranges rills 15 and 16, and newly establishes the lug slot 17 which carries out opening to these rills in land parts 5 and 9.

[0014] Other structures of a tire of following this invention here are easy to be what followed the custom of a tire conventionally. For example, a carcass becomes the turn nap ply of at least one sheet (three sheets) which rolled back the surroundings of a bead core outside from the inside of a tire. Ply uses what arranged the fiber code represented with rayon, nylon, and polyester in the direction (radial direction) which intersects perpendicularly with the equatorial plane of a tire substantially. A belt layer It covers full [of the main belt layer of the belt which arranged non-extensibility codes, such as a steel code and an aromatic polyamide fiber code, at the include angle of 10-35 degrees to the equatorial plane of a tire which two-layer was made to cross mutually and has arranged it at least]. If in charge of the formation in the auxiliary belt layer of at least one sheet which allotted the heat shrink nature code represented with a nylon code to the equatorial plane and real Kamitaira line of a tire, the thing which comes to carry

out a whorl volume according to the ribbon condition which put two or more codes in order in accordance with the periphery of the main belt layer is used, respectively. And the tread which becomes the tread pattern described above on this belt layer is arranged.

[0015]

[Function] Without increasing a pattern noise by preparing mostly SAIPU prolonged in the shape of S character between both tread edges in a tread hoop direction at equal intervals, the road-hugging of a tread is improved, and a degree of comfort is improved, and the wet engine performance is also improved according to the edge effect by SAIPU. In addition, as for the inclination to the major groove of SAIPU, it is desirable to consider as about 40-70 degrees on an average.

[0016] Furthermore, since the configuration which establishes many lug slots in the location which extends in the sense which is on SAIPU and intersects SAIPU, and carries out opening to a major groove, respectively, i.e., a lug slot, is not penetrated between the major grooves of the both sides whose land parts are pinched, each land part serves as a rib which follows a tread hoop direction as a matter of fact, therefore the reduction of a pattern noise of it is attained.

[0017] Here, as described above, they are the tread cross direction die length l, m, and n of the major groove and the start edge of a lug slot preferably One half of tread width of face Considering as the above is one half. It is because the wet engine performance deteriorates remarkably in the following. Moreover, although it is desirable to carry out to 90% of tread width of face as for an upper limit, it is because the hoop direction continuity of a land part will be spoiled and a pattern noise will increase, if this surpasses 90%. Furthermore, the acute-angle section of the land part which will be made by the crossover of a lug slot and SAIPU if the land part which the optimum range of alpha, beta, and gamma is 30-70 degrees whenever [tilt-angle / of a lug slot], namely, was surrounded by a lug slot, SAIPU, and the major groove at less than 30 degrees becomes small, it becomes easy to generate partial wear with lack of block rigidity and 70 degrees is surpassed on the other hand becomes small, and partial wear becomes easy to generate this similarly.

[0018] In addition, the tread pattern shown in drawing 1 and 2 can follow the above-mentioned basic pattern, can be further written as the arrangement in which a lug slot carries out opening to the major groove of the both sides of each land part by turns, and can be equally drained through a lug slot to the both sides of the major groove of the both sides whose land parts are pinched.

[0019]

[Example] According to the tread pattern shown in drawing 1 and 2, the radial-ply tire containing air of tire size 205/65 R15 (tread width of face: 140 mm) was made as an experiment under each following specification, respectively.

[0020] That is, in the sample offering tire A according to the tread pattern of drawing 1, major grooves 1-4 are width-of-face:6mm and depth:8mm, and SAIPU 10 is width-of-face:0.7mm and depth:6.5mm. And whenever [to a major groove / average tilt-angle]: It could be 55 degrees. Moreover, the lug slot 12 is alpha:40 degrees whenever [width-of-face:2-3mm, depth:6.5mm, die-length / of l:17mm /, and tilt-angle]. The lug slot 13 made [whenever / width-of-face:2-3mm, depth:6.5mm, die-length / of m:18mm /, and tilt-angle] beta:40-50 degrees and the lug slot 14 gamma:60 degrees similarly whenever [width-of-face:2.5 -3mm, depth:6.5mm, die-length / of n:14mm /, and tilt-angle].

[0021] On the other hand, it sets into the above-mentioned sample offering tire A, and the sample offering tire B according to the tread pattern of drawing 2 is width-of-face:1mm and depth:6.5mm. While forming rills 15 and 16, the lug slot 14 and the same lug slot 17 are newly formed. In this tread pattern, the lug slot 12 is alpha:40 degrees whenever [width-of-face:2.5mm depth:6.5mm, die-length / of l:8mm /, and tilt-angle]. The lug slot 13 made [whenever / width-of-face:3mm, depth:6.5mm, die-length / of m:12mm /, and tilt-angle] beta:50 degrees and the lug slot 14 gamma:60 degrees similarly whenever [width-of-face:3.5mm, depth:6.5mm, die-length / of n:12mm /, and tilt-angle].

[0022] Moreover, as a comparison, the tire (comparison tire C) was made as an experiment in the same size also about the tread pattern shown in drawing 3. The tread pattern shown in this drawing arranges one pair of rills 21 on both sides of two central major grooves 20, arranges one pair of major grooves 22 on the outside, arranges one pair of rills 23 on the outside further, respectively, and comes to arrange the

transverse grooves 24 and 25 of a narrow width which extend in the sense which inclined to the tread central region C divided by rills 21 and 23, and its both-sides region S to the major groove. In addition, for width-of-face:7mm and depth:8mm, and rills 21 and 23, width-of-face:1.2mm and depth:6.5mm, and transverse grooves 24 and 25 are [the central major groove 20 and a major groove 22] width-of-face:2-3mm and depth:6.5mm. Tilt angle: It considered as the arrangement prolonged at 45-70 degrees.

[0023] The result of having presented the pattern noise trial and the hydroplaning trial with these prototype tires, respectively is shown in Table 1. In addition, evaluation of each trial is each test result of the comparison tire C 100 It expressed with the characteristic when carrying out.

[0024] Here, the pattern noise trial carried out [sound / at the time of making it run a smooth road surface top by 40 - 100 km/h in the condition of having made the binary name getting on / in the car] feeling evaluation after equipping a subcompact with the tire made into internal pressure 1.8 kgf/cm².

[0025] Moreover, under the same conditions, the hydroplaning trial measured the tread crawler bearing area by the tread photography when carrying out rectilinear-propagation transit of the channel with a depth of 6mm by h in 80-90km /, and measured the residual ratio of this area.

[0026]

[Table 1]

	タイヤA	タイヤB	タイヤC
パターンノイズ	1 0 5	1 0 5	1 0 0
ハイドロプレーニング	1 0 0	1 0 0	1 0 0
備 考	実施例		比較例

[0027]

[Effect of the Invention] According to this invention, conventionally, only by amelioration of a tread pattern, that coexistence can offer the tread pattern which had the difficult outstanding wet engine performance and a difficult low noise property, and can realize high performance-ization of a tire by amelioration of a tread pattern.

[Translation done.]

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
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CLAIMS

[Claim(s)]

[Claim 1] By two or more major grooves and tread edges which extended the tread of a tire along with the tread circumference, and kept and allotted spacing crosswise [tread] In the pneumatic tire divided to two or more land parts which stand in a row in the hoop direction of a tread SAIPU which continues or is intermittent from the end to the other end in the above-mentioned tread, and is prolonged in the shape of S character in it The pneumatic tire which arranges at equal intervals mostly to the hoop direction of a tread, and comes to prepare many lug slots broader than this SAIPU in the location which extends in the sense which is on SAIPU and intersects SAIPU, and carries out opening to a major groove, respectively.

[Translation done.]